

## DRAFT

# Institutional Frameworks Case Study Lowell Brownfields Redevelopment, MA

## 1.0. Introduction/Summary

Like many older industrial cities, Lowell, Massachusetts has almost no previously undeveloped and vacant land available for development. As such, the city has identified the return of its Brownfields properties to productive use as critical to economic development and job creation efforts. This case study begins by describing the overall efforts of the city of Lowell to clean up and redevelop Brownfields. The case study also touches on four specific Brownfields redevelopment sites within the city. Then, the case study describes a variety of Brownfields programs provided by the State of Massachusetts and the federal government, some of which have been critical to successful Brownfields redevelopment in Lowell. The study concludes with a discussion of lessons learned.

The remainder of this case study is organized as follows.

- Section 2 provides background on the city and its overall approach to Brownfields redevelopment.
- Section 3 describes two Brownfields redevelopment projects within the city of Lowell.
- Section 4 describes other State and Federal Brownfields Programs that are available to and used by redevelopment projects in Lowell.
- Section 5 discusses lessons learned from problem assessment and the implementation of protective measures.
- Section 6 lists references consulted for the case study.

*Brownfields are abandoned, idled, or underused industrial and commercial properties where expansion or redevelopment is complicated by real or perceived contamination.*

## 2.0 Background

### 2.1 The City of Lowell

Lowell, Massachusetts is located on the Merrimack River 30 miles northwest of the Boston. The city is roughly 14 square miles and home to 105,000 people and 1,600 businesses. Historical land uses in Lowell have included residential, commercial, and industrial manufacturing, with textile mills being one of the most prominent historic industries. The city grew rapidly during America's Industrial Revolution and throughout the 19th and early 20th centuries. However, after World War I many of Lowell's manufacturing companies closed or relocated to southern states, sending the city into economic decline. The economic decline has continued in recent decades. In 2000, Lowell had 58% fewer manufacturing jobs and a 50% smaller industrial base than it did in 1990. As a result of the economic decline, Lowell is currently faced with a poverty rate of 18% and a large number of abandoned manufacturing buildings and contaminated properties.

## 2.2 *The City's Brownfields Redevelopment Approach*

The city of Lowell currently performs a wide range of activities designed to promote the redevelopment of abandoned or underused industrial properties. The city of Lowell has not established a designated Brownfields office to address these problems, but rather has incorporated its Brownfields projects into its overall economic development objectives. The city has four FTEs within the Division of Planning and Development (DPD) to perform the following types of activities:

- Community Outreach and Education. Lowell has developed a comprehensive, multilingual Brownfields education program. The city's population includes large Asian and Latino communities and many non-English speaking recent immigrants. Because of the significant number of non-English speaking residents, the city's education materials are translated into Portuguese, Spanish, and Khmer (a large portion of the Asian population is Cambodian). As well, all of the community meetings have translators. The city coordinates efforts with several neighborhood-based community groups that have cooperated on public education and outreach efforts. For two of the neighborhoods where Lowell is focusing redevelopment efforts, the city has developed community advisory councils consisting of residents, business owners, and community development corporation staff members. The city is also establishing neighborhood branch offices for outreach.
- Neighborhood planning. Lowell has hired a neighborhood-planning specialist, who is working with community residents to evaluate needs and goals for developing plans for the community.
- Site assessment, prioritization, and coordination. The city staff members conduct activities related to site assessment and prioritization. These activities are described further below. The city staff members also serve in a coordinating role for Brownfields cleanup and redevelopment projects.
- Coordination on health issues. The DPD is working with the city's health department to increase staff knowledge about environmental health, improve community outreach skills, gather information about Brownfields health hazards, and develop community outreach and education materials.
- Establishment of a Brownfields Cleanup Revolving Loan Fund. The city has received federal funding to establish a local Brownfields Cleanup Revolving Loan Fund. This effort has been stalled and is described further below.
- City Loan Programs. The city has used funding from a Community Development Block Grant received from the U.S. Department of Housing and Urban Development (HUD), as well as HUD Section 108 funds to establish two commercial financing programs that offer low-interest loans to commercial or industrial real estate projects. Loan amounts range from \$21,000 to \$100,000, and can be used for any remediation or cleanup activity.
- Lowell Banking and Business Consortia. The city of Lowell conducted outreach with the local banking community that lead to the development of two nonprofit banking and business consortia to attract and provide financial incentives for investing in redevelopment. The Lowell Development and Financial Corporation (LDFC) is dedicated to cooperative

business development and provides loans to generate private investment. The Lowell Plan works towards economic development in Lowell through cooperative alliances between businesses and government. The Lowell Plan has raised \$5 million to encourage development. Both organizations are composed of public, private, and government interests.

Lowell's Brownfields approach has evolved over the last several years. Important milestones in building the current approach include:

- Identification of Redevelopment Candidates. In the late 1990s, the city and regional planning organization (Northern Middlesex Council of Governments) used an HUD Community Development Block Grant to inventory Brownfields and develop a list of potential sites for redevelopment. This list included 317 sites within the city and regional planning effort.
- Site Prioritization. In moving forward with its Brownfields redevelopment efforts, the city has identified its top 17 sites as priorities for redevelopment in the city (considered as those with the greatest development potential).
- Site Assessment and Program Development. In 1996, Lowell received a \$200,000 Brownfields Assessment Pilot Grant from EPA and used those funds to develop strategies for redeveloping Brownfields and attracting new businesses, rank potential Brownfields sites, conduct site assessment of priority sites, and develop a community outreach and education program. The city has also received Brownfields site assessment funds from MassDevelopment, a quasi-governmental real estate and economic development agency.
- Showcase Community and Further Program Development. In 1998, the city of Lowell was named a Brownfields Showcase Community.<sup>1</sup> Brownfields Showcase Communities are supported by the resources of 15 federal agencies to address local cleanup and reuse issues in a more coordinated manner and are models demonstrating the benefits of collaborative activity on Brownfields. With this status, the city was awarded another \$200,000 grant and received an Intergovernmental Personnel Assignment (IPA) from the EPA. This staff person served for three years as the Brownfields Showcase Community coordinator and worked closely with the staff at DPD. The IPA brought a level of environmental and technical expertise not previously held by the staff of the DPD, as well as knowledge about funding sources and opportunities. The Showcase Community grant funds have been largely used on environmental assessments, educational materials, and community outreach efforts.

### **3.0 Lowell's Brownfields Redevelopment Projects**

This case study focuses specifically on two Brownfields redevelopment projects within the city of Lowell: the Lowell Regional Transit Authority bus operations and maintenance facility and the Acre neighborhood. The first project has been already completed. The second is included because the city has decided to focus about half of its Showcase Community resources on the

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<sup>1</sup> In March 1998, EPA designated 16 Brownfields Showcase Communities. Twelve additional Showcase Communities were selected in the fall of 2000. EPA has not yet announced its plans for selecting another round of Showcase Communities.

Acre and one other neighborhood. Some redevelopment activities within the Acre have been initiated already, while many others are still being planned.

### 3.1 Lowell Regional Transit Authority Bus O&M Facility

The Lowell Regional Transit Authority (LRTA) Bus Operations and Maintenance Facility has been built on a former Brownfields site. The facility currently has space for approximately 50 buses along with additional office space.

- **Measures to Address Existing Contamination.** The site had formerly been home to a circuit board manufacturer and an electroplating facility. From 1979 to 1988, the site was home to Astro Circuits. During that time, chemical waste was stored and treated in underground storage tanks, and subsequently illegally released into the Lowell sewer system.<sup>2</sup> A company called Multi-Core took the building over in 1988 and operated until closing in 1992, leaving behind more contamination, including barrels of chemicals. The site remained vacant from 1992 until the time of redevelopment. The Massachusetts cleanup action level of 6,000 ppm for lead was used in cleaning up the site. Protective measures included a combination of excavation and hauling of contaminated soils above the cleanup action level and the capping of soils below the cleanup action level. Capping included a minimum of 12" of gravel and 3" of pavement or a building. Because some contamination was left on site, Activity and Use Limitations (AULs) were also established for the site. AULs are deed restrictions and deed notices that lock in the assumptions that were used to select the appropriate cleanup standards, and provide critical information to future property owners about the status of response actions.
- **Project Costs and Funding.** The LRTA has invested over \$5 million on purchasing and renovating the 6.5-acre, 70,000 square foot site.

| LRTA Bus O&M Facility Investment     |                      |
|--------------------------------------|----------------------|
| Purchase Price                       | \$3.1 million        |
| Site Improvements                    | \$2 million          |
| <i>Total Site Investment by LRTA</i> | <i>\$5.1 million</i> |

- **Relationship to the Lowell Brownfields Approach.** The LRTA facility is the first development to use the State's Covenant Not to Sue program, described further below. The agreement with the state Attorney General's office leaves LRTA responsible for monitoring the site, per Massachusetts Department of Environmental Protection (DEP) guidelines, and give the LRTA protection from any suits seeking cleanup or retribution from past contamination. Site testing, performed with help from the MassDevelopment site assessment funds, has found contamination to be centralized and stagnant.

### 3.2 The Acre Neighborhood

The Acre is a one square mile neighborhood that is also Lowell's oldest and most economically disadvantaged. The city of Lowell has identified the Acre neighborhood as one of its top

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<sup>2</sup> Because of this illegal activity, the president of Astro Circuits was the first Massachusetts businessperson to be sent to prison for violating environmental laws.

priorities for Brownfields redevelopment. The Acre has many abandoned mill buildings and other industrial sites. The neighborhood has also been designated by HUD as an Enterprise Community area, making it available for specific financial and tax benefits, described below.

The city of Lowell is working in cooperation with the Coalition for a Better Acre (CBA), a local community development corporation. CBA and the city have worked on the development of a twenty-year urban revitalization and development plan for the Acre neighborhood. The city and CBA are holding meetings about a number of topics, including the Acre development plan; the Massachusetts Environmental Protection Act (MEPA) process; state and general environmental regulations; the effect of hazardous waste on property values; Brownfields health issues; and issues associated with the relocation of businesses and residents. At each community meeting, background information is provided about the overall goals, history, and issues surrounding Brownfields redevelopment, so that even those new to the process will have a basic understanding.

The Acre development plan has been reviewed and approved by the Massachusetts Department of Housing and Urban Development. As well, an Environmental Notification Form must be filed under MEPA to ensure that all redevelopment activities consider environmental issues, such as protection of natural resources. The MEPA process seeks to ensure that the redevelopment does not significantly contribute to environmental degradation, includes environmental assessments, minimizes environmental impacts, and seeks widespread community input.

There are a number of Brownfields throughout the Acre neighborhood, a few of which have already been redeveloped. Examples of redevelopment projects in the Acre include the rehabilitation of homes, new residential units in the neighborhood, and the Market Basket, a local grocery store chain.

Currently, the city of Lowell is focusing its attention on a 6 1/2-acre tract where there is a former natural gas facility, businesses, and a few residential properties. The city has identified the need for a new school in the area and hopes to build a middle school on the site. To do so, zoning for the area will be changed from industrial to residential. Studies have found elevated levels of lead and arsenic on the site with concentrations as high as 180 ppm arsenic and 10,000 ppm lead. Average contamination levels include 23 ppm arsenic and 1100 ppm lead (across multiple depths and over the entire 6 1/2 acres).<sup>3</sup> Most of the analysis on soil contamination has been done by using an XRF (X-Ray Fluorescence) machine.

Although Brownfields redevelopment projects are usually conducted by Licensed Site Professionals (described further below), DEP is involved with this project because it is an area where there is high potential for exposure. DEP is currently reviewing the cleanup and redevelopment plan, which includes several options for a combination of soil removal (in the areas of highest contamination) and capping. One option includes removal of 32,000 cubic yards of soil. This option may not require a cap and is estimated to cost \$1.8 million. Another option includes the removal of 5,000 to 10,000 cubic yards of soil and capping. This second option is the city's preferred option. Any further action on this Brownfields redevelopment project is awaiting the completion of DEP's review.

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<sup>3</sup> The state cleanup standard for residential or school properties is 30 ppm for arsenic and 300 ppm for lead. However, the state also allows site-specific risk characterization for levels that may be left on site and capped.

## **4.0 Other State and Federal Brownfields Programs Utilized in Lowell Brownfields Redevelopment**

There are a wide variety of State and federal programs and funding sources that the city has either taken advantage of or is eligible for. These are described in further detail below.

### *4.1 Technical Assistance/Services*

The Governor's Office for Brownfields Revitalization offers a variety of assistance to landowners, buyers, developers, and municipalities, including the following:

- Information and access to all Brownfields programs and other State business incentives
- Expertise with project sequence and considerations for public and private projects
- Ombudsman support for Brownfields projects
- Assistance for municipalities and other public entities in pursuing Brownfields projects
- Access to environmental insurance for developers and lenders (the BRAC, described further under liability protections)
- Assistance on projects working with other State agencies and quasi-public entities
- Assistance with municipal tax abatement provision
- Administration of an on-line real estate listing service for sellers and buyers of Brownfields

The State of Massachusetts has a privatized cleanup program in that it licenses private professionals to oversee most cleanup projects. This enables State employees to focus on just the most serious cleanup projects. DEP oversees the cleanup of only those situations presenting the highest risk. DEP has established generic cleanup standards for the most frequently found contaminants, allowing the Licensed Site Professionals to determine "how clean is clean enough" up front. Licensed Site Professionals have conducted all of the Brownfields redevelopment projects in Lowell, with the exception of one Superfund Site where the U.S. EPA oversees cleanup.

Cleanup decisions may be risk-based, meaning that the Licensed Site Professional should consider the activities that are likely to occur at the site and the corresponding exposures to any remaining oil or hazardous materials on the site. DEP audits all AUL sites.

Response Action Outcomes mark the completion of cleanup. DEP conducts random audits of 20% of response actions to ensure that private sector cleanups, conducted by Licensed Site Professionals, have been done properly.

### *4.2 Health Monitoring*

The Lowell Health Department (LHD) received a one-year grant from the federal Agency for Toxic Substances and Disease Registry (ATSDR) for \$70,000 to help the LHD increase its capacity to address brownfields-related health issues.<sup>4</sup> The primary objectives of this effort are to increase staff knowledge about environmental health and improve community outreach skills, to gather information about brownfields health hazards, and to develop community outreach and education materials. Through this grant, the city has also convened a Community Health

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<sup>4</sup> The city's Division of Planning and Development has also contributed \$22,000 to help support this effort.

Advisory Board, consisting of representatives from neighborhood groups, to identify and address community interests around Brownfields. In coordination with the LHD, the Community Health Advisory Board will conduct a community needs assessment, which will establish a baseline measure of community knowledge and priorities for health issues.

#### *4.3 Funding Sources and Mechanisms*

The Acre neighborhood and other census tracts within the city of Lowell have been designated by the HUD as an Enterprise Community. As well, the whole city qualifies under State Brownfields law as an Economically Distressed Area and has been identified as an Economic Target Area of economic development incentive program benefits. These State and federal designations qualify projects in Lowell for specific financial incentives and benefits described below.

- Federal Brownfields Tax Incentive. Under the Brownfields Economic Redevelopment Initiative, EPA provides a Brownfields Tax Incentive to assess and cleanup Brownfields. In 1996, Lowell received a \$200,000 Brownfields Assessment Pilot Grant from EPA as part of this Initiative. With the Brownfields Tax Incentive, environmental cleanup costs are fully deductible in the year they are incurred. Qualified project must be located in an EPA Brownfields Assessment Pilot area, census tracts where 20% or more of the population is below the poverty level, or a federally designated Empowerment Zone or Enterprise Community, such as the Acre or other neighborhoods within the city of Lowell.
- Federal Brownfields Cleanup Revolving Loan Fund Pilot Program. Another component of the EPA's Brownfields Economic Redevelopment Initiative is the award of pilot cooperative agreements to state, counties, cities/towns, and Indian tribes to capitalize the Brownfields Cleanup Revolving Loan Fund (BCRLF). The city of Lowell was awarded a BCRLF grant of \$500,000 in 1999 to establish a local BCRLF. However, this money has not yet been used due to what city staff described as "too much red tape" required by EPA. However, they acknowledged that EPA is trying to reduce these impediments, and believed that some of the money would be used for an upcoming school development project in the Acre neighborhood.
- State Municipal Back Tax Abatement. Under current State law, municipalities designated as Economic Target Areas, such as Lowell, can negotiate away outstanding tax obligations at contaminated sites in exchange for a commitment from a new party to clean up and redevelop such sites and return them to the community's tax rolls. Adopting the local option provision enables a municipality to decide on a project-specific basis how much and whether to abate taxes when a redevelopment opportunity arises. For the municipality to reach agreement with a private purchaser, the purchaser must not have caused or contributed to the contamination and did not own or operate the site with the contamination occurred. The property in question must be zoned for commercial or industrial use and must contain oil or hazardous materials.
- State Tax Credit. The State has made tax credits available for cleanup costs. To qualify for the tax credit: (1) The taxpayer must be an innocent owner (e.g., did not cause or contribute to the contamination); (2) The cleanup costs must be 15% or more of the pre-remediation property value; (3) The property must be located within a designated Economically Distressed Area (such as the city of Lowell); (4) Cleanup must be conducted in compliance with applicable laws; and (5) The property must be owned for leased for business purposes.

Properties without an Activity and Use Limitation (AUL) on the property are eligible for a 50% tax credit. Properties with an AUL are eligible for a 25% tax credit.

- State Abandoned Buildings Tax Deduction: Under State law, projects in Economic Target Areas, such as the city of Lowell, are eligible for a State Abandoned Building Tax Deduction of 10% of renovations costs, provided that the building has been at least 75% vacant for two years.
- State Brownfields Redevelopment Fund: The State Brownfields Redevelopment Fund provides State funding for loans and grants for site assessments and remediation actions. The \$30 million fund is administered by MassDevelopment, a quasi-public real estate and economic organization, and is available for both the private and public sectors. Thirty percent of the funds are earmarked for site assessments and include loans up to \$50,000 with zero percent financing. Maximum financing is \$500,000 for cleanup projects. Eligible projects must be in Economically Distressed Areas, such as the city of Lowell.

#### 4.4 *Liability Protections*

The federal government has defined liability and liability protections under CERCLA. This section, however, focuses on the State programs designed specifically to address Brownfields redevelopment.

- State Subsidized Insurance Program – Brownfields Redevelopment Access to Capital (BRAC). The Massachusetts Business Development Corporation (MassBusiness) is a private corporation created to provide loans and investment capital to businesses in Massachusetts. Through MassBusiness, the State provides access to a State-subsidized and created insurance program for lenders and developers. Through BRAC, the State subsidizes 50% of the insurance premium for most business projects. With this subsidy, the costs of coverage can be as little as \$15,000 for a \$5 million project, with cleanup costs of \$1 million.

Developers: The BRAC program provides environmental insurance<sup>5</sup> for developers designed to cover both cleanup cost overruns and liability arising from newly discovered pre-existing environmental contamination.

Lenders: The BRAC program provides secured creditor coverage designed to protect lenders from loss due to a default related to environmental issues. Secured creditor coverage includes: (1) Protection for lenders against loss on cleanup loans and contemporaneous related construction loans, and (2) protection from default on project loans arising from unanticipated environmental costs, in the unlikely event that the environmental insurance coverage is insufficient.

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<sup>5</sup> Environmental coverage includes: (1) Cleanup costs that exceed the planned costs for the approved cleanup plan. Deductible equals 15% of cleanup costs for cost cap coverage. (2) Cleanup costs for unknown pollution conditions discovered during cleanup, within planned cleanup and property boundaries. (3) Cleanup costs for unknown conditions discovered outside of planned cleanup, but within property boundaries. (4) Third party coverage for cleanup costs, property damage, and personal injury resulting from preexisting, yet unknown conditions beyond the insured's property boundaries. (5) Business interruption coverage for the insured's losses due to pollution being discovered outside the planned cleanup area. (6) Legal defense coverage for claims arising from pollution conditions outside of the planned cleanup area. (7) Five-year term, option to renew.



- State Statutory Relief. Under State law, once a site is cleaned up, innocent persons are relieved of liability to the State and third parties. Innocent persons are defined as those who did not own or operate the site at the time of the release and who did not cause or contribute to the contamination at the site. As well, tenants, down gradient property owners, redevelopment authorities, community development corporations, economic development and industrial corporations, municipalities, government bodies, charitable trusts, and secured lenders are relieved of liability to the State and third parties, in many cases without having to conduct any cleanup action to obtain or maintain liability relief.
- State Covenant Not to Sue. Under new State law, a party who conducts a cleanup and redevelopment but does not qualify for the statutory relief described above may negotiate with the Office of the Attorney General for liability relief from the State and third parties and for property damage. A brownfields Covenant Not to Sue can offer liability protection to parties for sites where a permanent solution (no significant risk) is deemed infeasible so that the cleanup achieves a temporary solution (no substantial risk). To qualify, the project must contribute to the physical or economic revitalization of the community in which it is located. The LRTA facility in Lowell was the first deal to ever use the State's Covenant Not to Sue program.

## 5.0 Lessons Learned

### 5.1 *What Worked Well*

The city of Lowell has successfully leveraged funding from a variety of State, federal, and private sources for its projects, reducing the amount of local resources needed to redevelop sites. This city has also successfully attracted private investors and developers to its Brownfields sites.

One challenge the city has faced, especially in attracting private redevelopment projects, has been apprehension on behalf of lenders and developers about contamination of Brownfields sites. City staff members believe that the State site assessment funding has been critical to getting developers and lenders over their “fear of the unknown” by providing the ability to find out the actual nature of contamination on a site.

Staff members at DPD believe that the IPA provided by EPA for three years was critical to their success. The IPA provided a level of environmental and technical expertise and experience that the city staff did not previously have. By the end of the three years, the city staff had gained significant experience in these areas. As well, the IPA was invaluable in helping to identify funding sources that the city has been successful in leveraging.

DPD staff members also believe the city has benefited from the State of Massachusetts' Brownfields legislation. Massachusetts is a leader in creative solutions to Brownfields redevelopment issues, including tax credits, financial incentives, and liability protections. City staff members also believe that a critical aspect to the Massachusetts Brownfields programs and legislation has been having the involvement of the right agencies; for example, having the Department of Revenue provide tax relief programs. This involvement of many State agencies has required coordination and communications between agencies. The Governor's Office for

Brownfields Revitalization has provided this critical function and helps funnel projects to the right State agencies.

## *5.2 What Did Not Work Well*

One of the city's most obvious successes, its ability to coordinate among organizations and government agencies to raise funds for redevelopment projects, also points to one of its biggest challenges. To date, many of the successful redevelopment efforts in the city have been largely funded by public entities and have been public projects (e.g., the LRTA bus facility, as well as a large public arena and ballpark not included in this case study). Although the city has developed a number of strategies to attract private developers, at this point in time it is difficult to point to examples of successful private redevelopment projects in the city. This is not to say that private redevelopment projects have not occurred, and the city is hopeful that the strategies it and the State has developed to attract private developers will be successful.

Another challenge faced by DPD staff is the city's historic lack of community involvement. This is in large part due to the high percentage of non-English speaking residents and high percent of non-citizen residents. For example, of the more than 35,000 Southeast Asian residents, fewer than 1,000 of them are naturalized citizens. Another factor contributing to the lack of community involvement is the high number of renters. For example, in one neighborhood, the home ownership rate is currently only 15% - one of the city's goals is to increase home ownership rates.

Staff members from DEP have expressed mostly positives and a few negatives about the nature of the State's Brownfields program. They believe that having the involvement of a number of State agencies has been key to the success of Brownfields redevelopment. However, there are also some disadvantages of not having a centralized Brownfields program. For example, the number of different agencies involved has required extensive communications and education efforts. It has been an ongoing challenge to get the word out about the variety of programs available.

Another example cited by DEP staff is that the State does not have an official definition of Brownfields, and sites do not sign up or register as Brownfields sites. This has made it difficult to measure and demonstrate success to other parties, such as the State legislature. Those who legislate funding for the State's programs frequently ask questions such as "how many Brownfields sites have been cleaned up?" Because of the lack of official definition or centralized program, it has been difficult to impossible to answer that type of question and demonstrate real success.

Because of the nature of the statutory relief provided under Massachusetts State law, property owners do not receive written statement of this liability relief. Staff members at the city of Lowell believe this has created some confusion for people, who would prefer to have a written statement.

## 6.0 References

City of Lowell, fact sheet on “LRTA Bus Maintenance / Operations Facility”, undated.

Commonwealth of Massachusetts Executive Office of Environmental Affairs Department of Environmental Protection, “Summary of the Brownfields Act: Chapter 206 of the Acts of 1998”, 1998.

The Commonwealth of Massachusetts Office of the Attorney General, “The Attorney General’s Brownfields Covenant Program” (fact sheet on the Brownfields Act of 1998), undated.

Connors, Brian, City of Lowell Division of Planning and Development. Telephone interviews by the authors. May 2, 2002.

The Governor’s Office for Brownfields Revitalization website at  
<http://www.state.ma.us/massbrownfields.htm>

The International City/County Management Association, “Surveying the Local Programs: Case Studies of the Brownfields Showcase Communities”, June 2001.

Spiess, Daniel, Massachusetts Department of Environmental Protection. Telephone interviews by the authors. April 30, 2002.

United States Environmental Protection Agency, “Brownfields Cleanup Revolving Load Fund Pilot Program” – Quick Reference Fact Sheet, EPA 500-F-01-324, September 2001.

United States Environmental Protection Agency, “Brownfields Showcase Community: Lowell, MA” - Quick Reference Fact Sheet, EPA 500-F-98-261, November 1998.

United States Environmental Protection Agency, “Brownfields Tax Incentive” – Quick Reference Fact Sheet, EPA 500-F-01-339, August 2001.

United States Environmental Protection Agency,  
<http://www.epa.gov/region01/brownfields/programs/showcase/lowell.htm>, last revised February 22, 2002.